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Training Development Plan (Final)

Version 1.0

Submitted by:

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Traffic Management Advisor (TMA) Curricula

Contract Deliverable Description
30_0030_CDRL_1282_0002_20111003

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Booz Allen Hamilton

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1 Introduction

1.1 Background

The Traffic Management Advisor (TMA) is an Air Route Traffic Control Center (ARTCC)-based, decision-support tool designed to optimize the flow of aircraft into capacity constrained areas, and to provide a consistent flow of traffic to the runway. It is operational at all 20 domestic Centers and select Terminal Radar Approach Controls (TRACON). Additional enhancements to the tool, such as Point-in-Space Metering, the expanded use of Adjacent Center Metering (ACM), and deployment to additional airports, are integral parts of the Federal Aviation Administration (FAA) NextGen Implementation Plan (NGIP).

In 2009, the Radio Technical Commission for Aeronautics (RTCA) NextGen Mid-Term Implementation Task Force, a consortium of more than 300 members from the aviation community, assessed the progress of NextGen implementation and presented the FAA with a unified set of priorities for NextGen's next 5 years. Recommendations for the cruise environment, in support of better utilization of available airspace to increase capacity and reduce delays, included expansion of TMA capabilities. In addition, the Task Force noted a lack of standardized TMA training. The final report included a requirement for an improved training program for air traffic control and traffic management personnel at sites where TMA is deployed, with the goals of increasing the consistent use of time-based metering (TBM) and completing training of all field facility personnel by 12/31/1012.

Currently, a national training program for the TMA system does not exist, resulting in a lack of understanding of its full capabilities, local rather than national adaptation of the tool, and a lack of basic concepts, understanding, and standard operating procedures.

Initial discussion and analysis of the requirements (including customer input) suggest that four instances of the TMA training course will need to be developed and deployed. These preliminary course requirements were identified by the customer, the AJL-14 Technical Content Lead (TCL), and the AJL-43 Training Development Lead (TDL) during the initial requirements meeting.

Consensus was found among subject matter experts (SMEs) that a portion of this training would have to occur at the local level. A local adaptation for airspace, policies, and procedures is required for effective TMA use. While there are many elements of the TMA training that can be delivered universally, there are other areas where

locally adapted information will be necessary for maximum effectiveness.

To enhance the standardized and most efficient use of the tool, the FAA created an action plan in their response to the RTCA Task Force recommendations to create an improved TMA training program for all field facility users.

1.2 Purpose and Scope

This Training Development Plan (TDP) is a planning, communication, and coordination document requiring agency review and approval. Upon approval, this TDP shall serve as the baseline design of products for development of the standardized TMA curricula.

This TDP contains the strategies for developing TMA training, as required by the FAA Statement of Work (SOW). The TDP builds on the information that was gained by completing analysis and the media selection for the training effort.

This TDP includes the list of tasks to be trained, training outcomes, and terminal learning objectives (TLOs) for each course. The training outcome(s) and TLOs will indicate the degree to which the training will replicate job conditions and standards. Additionally, they will clearly specify the following:

- Conditions under which students will be expected to perform
- Tasks they must perform
- Standard of performance that is expected following training.

The TMA curriculum will produce the following benefits:

- Promote a greater understanding of TMA
- Enable the operator to utilize TMA to provide more efficient flow management and maximize available airspace
- Provide a baseline for consistent use of the tool across the system
- Improve the collaboration and working relationship between the Traffic Managers and Certified Professional Controllers (CPC)/Air Traffic Control Specialists (ATCS)

- Foster an effective use of TMA to promote increased safety and efficiency within the National Airspace System (NAS).

This curriculum may include a combination of scenario-based labs (SBL), instructor-led classroom, Web-based training (WBT), scenario-based hands-on applications, and blended learning.

1.3 Document Organization

This document is organized into the following major sections:

- Introduction—includes the background, purpose, list of applicable references, and document organization
- Planning Data—provides training outcomes and TLOs, tasks to be trained, course(s) to be developed, key personnel, approach to the courseware, media selection analysis, and training approach rationale
- Management—covers the quality assurance provisions, assumptions, OSHA regulations, hardware requirements, FAA resources required, issues and concerns, project milestones, and funding requirements and cost analysis
- Supplementary Information—covers lists of acronyms, abbreviations, glossary of terms, index, and other supporting material
- Appendices—includes an acronym list, course map, course calendar, and draft project schedule, synopsis of FAA site visit analysis data.

1.4 List of Applicable References

The primary references for the development of the TMA curricula have been identified as government furnished information (GFI) in TDP Attachment A – GFI List.

2 Planning Data

2.1 Training Outcomes and Terminal Objectives

Training outcomes and TLOs are detailed in TDP Attachment B – Curriculum Organization.

2.2 List of Tasks to be Trained and Other Task Analysis Data to be Used

The list of tasks to be trained and other task analysis data to be used are detailed in TDP Attachment B – Curriculum Organization.

2.3 Courses to be Developed and Number of Students to be Trained in Each Course

Based on discussions at the 16-18 August 2011 FAA TMA kickoff meeting held at the Fort Worth Air Route Traffic Control Center (ZFW) in Fort Worth, Texas, a comprehensive Cadre curriculum will be developed and adapted into sub-curricula for the remaining target audiences using modularized content. These curricula are aligned to their target audiences in Table 1 below.

Table 1 – TMA Curricula

		Target Audiences						
		Cadre	TMC En Route/	TMC Termina	CPC En Route	CPC Termina	Academ	Academ
Curricula	Traffic Management Advisor (TMA) Cadre Curriculum	X						
	Traffic Management Advisor (TMA) TMC En Route/ ATCSCC Curriculum		X					
	Traffic Management Advisor (TMA) TMC Terminal Curriculum			X				

		Target Audiences						
	Traffic Management Advisor (TMA) CPC En Route Curriculum				X			
	Traffic Management Advisor (TMA) CPC Terminal Curriculum					X		
	Traffic Management Advisor (TMA) TMC Academy Curriculum						X	
	Traffic Management Advisor (TMA) ATC Academy Curriculum							X

Table 1 and courses to be developed are further detailed in TDP Attachment B – Curriculum Organization. TDP Attachment B – Curriculum Organization shows the module, training outcome, TLO, and task aligned to each curriculum, providing a detailed map of the total curricula structure for TMA training. This attachment will be further designed based on SME feedback and finalized with the Course Design Guide (CDG), which includes enabling learning objectives (ELO) and more details describing the course flow.

The estimated number of students to be trained per audience are shown in Table 2.

Table 2 – Training Audience

Course #	Audience	# in Group
1	Cadre	up to 160
2	TMC En Route/ATCSCC	~590
3	TMC Terminal	~200
4	CPC En Route	8000
5	CPC Terminal	3000
6	Academy TMC	~80
7	Academy ATCS	~80
	TOTAL	**12110**

The course goal for each target audience is listed below:

- Traffic Management Advisor (TMA) for the Cadre

  - The goals of this course are for the learner to be able to demonstrate TMA subject matter expertise, use all elements of TMA to safely and efficiently move aircraft through the NAS, explain the impact of controllers' TMA actions and procedures on other elements of the NAS, and train other TMA users.

- Traffic Management Advisor (TMA) for TMC En Route and ATCSCC
  - The goals of this course are for the learner to be able to use TMA components to safely and efficiently manage metering and explain the impact of controllers' TMA actions on other elements of the NAS.
- Traffic Management Advisor (TMA) for TMC Terminal
  - The goals of this course are for the learner to be able to describe how TMA is used to manage metering and explain the impact of controllers' TMA actions on other elements of the NAS.
- Traffic Management Advisor (TMA) for CPC En Route
  - The goals of this course are for the learner to be able to describe how TMA is used to manage metering, use TMA data to meet metering requirements, and explain the impact of controllers' TMA actions on other elements of the NAS.
- Traffic Management Advisor (TMA) for CPC Terminal
  - The goals of this course are for the learner to be able to describe how TMA is used to manage metering and explain the impact of controllers' TMA actions on other elements of the NAS.
- Traffic Management Advisor (TMA) for TMC Academy
  - The goal of this course is for the learner to be able to describe how TMA is used to manage metering and describe its components.
- Traffic Management Advisor (TMA) for ATCS Academy
  - The goal of this course is for the learner to be able to describe how TMA is used to manage metering.

2.4 KEY PERSONNEL

Various key personnel will be required to design, develop, deliver, and evaluate the training. The key personnel estimate is detailed in Table 3.

Table 3 – Estimated Key Personnel

#	Name	Title	Role	Responsibility
1.	TBD	Government Task Order Representative (TOR)	Management Personnel	Responsible for the day-to-day management of the technical performance and costs of the training development effort
2.	TBD	Government Technical Training Lead	Management Personnel	Responsible for the day-to-day management of the technical performance and costs of the training development effort
3.	TBD	Contractor Program Manager	Management Personnel	Responsible for the day-to-day management of the technical performance and costs of the training development effort
4.	TBD	Contractor Task Lead	Management Personnel	Responsible for the day-to-day management of the technical performance and costs of the training development effort
5.	TBD	Lead Instruction Systems Designer	Instructional Development Staff	Responsible for the final product and training strategy
6.	TBD	Instructional Developer 1	Instructional Development Staff	Responsible for developing and documenting the lesson content and sequence, as specified by the designer and the subject matter expert (SME)

#	Name	Title	Role	Responsibility
7.	TBD	Instructional Developer 2	Instructional Development Staff	Responsible for developing and documenting the lesson content and sequence, as specified by the designer and the subject matter expert (SME)
8.	TBD	Programmer 1	Multi-Disciplinary Support Staff	Programs WBT lessons from WBT materials developed by the ISD team and uses FAA approved authoring tools and templates
9.	TBD	Programmer 2	Multi-Disciplinary Support Staff	Programs WBT lessons from WBT materials developed by the ISD team and uses FAA approved authoring tools and templates
10.	TBD	Graphic Artist 1	Multi-Disciplinary Support Staff	Creates graphics for various types of training materials including 2D, 2.5D, and 3D
11.	TBD	Administrative Support 1	Multi-Disciplinary Support Staff	Responsible for proofreading and technical editing of instructional materials and developed products
12.	TBD	Subject Matter Expert 1	Subject Matter Expert	Responsible for assuring content validity and technical accuracy of the materials, and is knowledgeable about OSHA regulations and requirements

#	Name	Title	Role	Responsibility
13.	TBD	Course Manager/Instructor 1	Instructor	Responsible for facilitating both synchronous and asynchronous learning
14.	TBD	Course Manager/Instructor 2	Instructor	Responsible for facilitating both synchronous and asynchronous learning

13.1 Approach to be taken for each course

The technical approach for the TMA curricula will follow the systematic training development process in accordance with guidelines set in FAA STD 028C as shown in Figure 1.

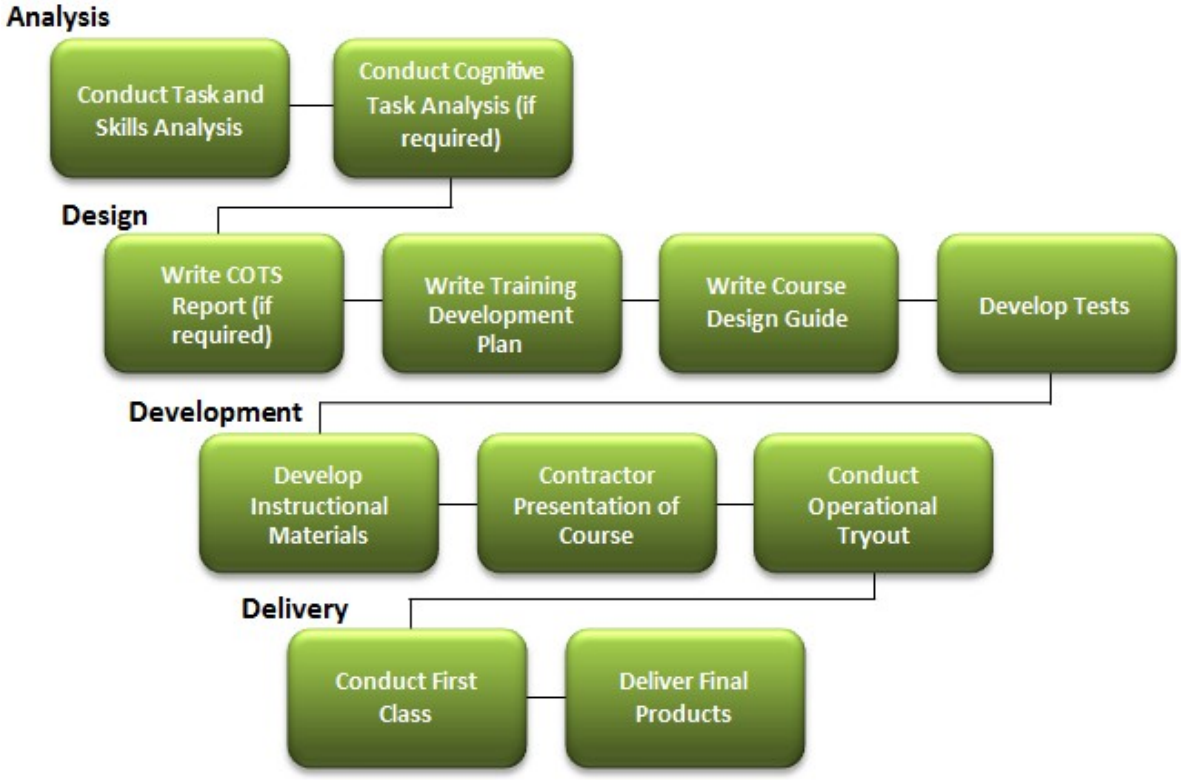

Figure 1 – Systematic Training Development Process

Phase 1: Analysis

Purpose: The analysis phase identifies specific information about job performance needed for the design and development of quality training. Analysis is also used in the design phase to

determine the most effective manner of training personnel to achieve the desired job performance.

Analysis for the Traffic Management Advisor (TMA) curricula was performed by both the FAA and Booz Allen Hamilton) (Booz Allen). The FAA conducted multiple site visits and gathered job task analysis data from the field, which was provided to Booz Allen. The full compilation of this analysis is located in TDP Attachment C – Analysis Data. A brief synopsis of aggregate data is provided in Appendix F: FAA Analysis Synopsis.

Additional analysis for the TMA curricula was conducted at the 16-18 August 2011 FAA TMA kickoff meeting held at ZFW, Fort Worth, Texas, between FAA program managers, FAA TMA SMEs, and Booz Allen training specialists in the identification of course requirements. During this meeting, FAA provided Booz Allen with several thousand pages of GFI, which have been reviewed and incorporated into this document. Additional outputs of this meeting include meeting notes and a draft task list, which are also included in TDP Attachment C – Analysis Data.

Output(s):

- Task and Skills Analysis (DID-2) (Not required as a contract deliverable)
- Cognitive Task Analysis, if required (DID-3) (Not required as a contract deliverable).

Phase 2: Design

Purpose: The design phase focuses on determining the most effective manner in which to train employees to achieve the desired level of job performance. In the design phase, plans for achieving the training are prepared, individual courses are designed, and test items that measure the objectives are developed.

Design of the training is based upon specific training objectives. These objectives are described in more detail in Attachment B. The training will incorporate a variety of SBL, ILT, WBT, scenario-based hands-on applications, and blended learning throughout the curricula. All instructional activities will support the training objectives, provide maximum participant engagement throughout the training, and focus on ensuring that participants can perform effectively on the job.

TDP Attachment B – Curriculum Organization provides a listing of the course modules, training outcomes, and TLOs. The specific length, sequence, and objectives for each lesson will be defined during the SME content-gathering sessions and documented in the Course Design Guide. The course structure will be amended to reflect SME discussions and decisions.

Additionally, the course structure will be expanded to include the instructional strategy and media type(s) for each lesson during the development of the CDG.

The final training design will include four types of training. These include:

1. Transition Training: This type of training will include the full training course, or modules required for each user group. At the end of the training, students will take a test to demonstrate their knowledge of the subject matter and their ability to perform job tasks. This training may not include procedures training.

2. Procedures Training: The development of national procedures for TMA is an FAA work in progress. If procedures are approved, and provided to Booz Allen by the FAA prior to submission of the final CDG, should they will be included in the TMA curricula as a training module.

3. Refresher Training: This type of training will be a variant or subset of the transition training. Expert skill level TMA operators have the opportunity to test out of various training modules for which they can demonstrate mastery of the subject matter. Novice to intermediate skill level TMA operators will complete priority training modules. Regardless of skill level, all students will be required to take modules that focus on content that has been updated or modified since their last successful completion of Transition Training.

4. Proficiency Training: Self-paced job aids will be prepared for students that include various scenarios for performing tasks under full job-like conditions on TMA. It will be recommended that all students complete these self-paced hands-on scenarios, but will not be a training requirement.

Additionally, final training design will include tests to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. The specific type of test

item to use should be determined by the behavior specified in the objective to be tested and the instructional delivery system used. Various types of test items may be used and are described in Table 4 below.

Table 4 – Test Strategies

Test Item Type	Characteristics
Multiple-choice	• Useful for testing knowledge and cognitive abilities • Consists of a stem and four responses • This type of test will be the primary mechanism for demonstrating the basic understanding of TMA
Matching	• Useful for testing terms and labels • Consists of two columns of related words, phrases, or symbols to be matched by the student • This type of test will be used rarely
True/False	• Useful for testing knowledge • Consists of a single statement • This type of test will be avoided
Completion or “fill in the blank”	• Useful for testing recall of knowledge committed to memory • Consists of a statement from which a word(s) or short phrase has been omitted. The student must supply the missing word(s) or phrase in the blank(s) provided • This type of test will be used rarely
Performance	• Useful for testing job tasks and skills • Consists of a checklist and a simulated or actual environment with certain conditions of performance and certain expected outcomes • This type of test will be used heavily for performing TMA functions
Physical response	• Useful for testing motor skills • Consists of a device that requires the student to locate or identify an item or manipulate it in some manner • This type of test will be used heavily for performing TMA functions. It will also be used as supplemental to Multiple-choice questions to allow for increased interactivity in WBT

Output(s):

- COTS Report (DID-4) (Not required, GFI report included as TDP Attachment A – GFI List to this document)
- Training Development Plan (DID-5) (This document)
- Course Design Guide (DID-6) (Future deliverable)
- Tests (DID-7) (Test strategies are delivered with this document).

Phase 3: Development

Purpose: In the development phase, the instructional materials for the course are developed, validated, and revised.

Detailed instructor guide(s), as well as a student guide(s), will support the course modules. Documents will be developed in Microsoft Word for ease of maintenance and update. Presentation materials will be developed in Microsoft PowerPoint. Multimedia files will use standard formats that are royalty free for playback.

The following authoring tools are recommended for use in the development of multimedia in support of TMA training:

- Adobe Flash - used to deliver the lesson content and software simulation elements
- Autodesk 3D Studio Max - used to design and develop 3D models
- Adobe Photoshop - used to design and develop 2D graphics
- Rapid Online Content Creation Environment (ROCCE) - used to drive the narrative and sequential aspects of the lesson via XML and HTML templates
- MP3 - used to develop audio files
- FLV - used to develop video or long animation sequence files.

These industry standard technologies will accommodate rapid development of WBT. Additionally, the WBT will be developed using the SCORM protocol for training development. This strategy will make electronic Learning Management System (eLMS) integration, reuse, and the passing of conformance testing possible. A full report on the use of media can be found in Attachment D.

It may be necessary to design instruction for FAA support labs equipped with TMA systems for hands-on exercises, which may be either self-paced or instructor-led. Additionally, full scale simulations may require design and development to deliver effective instruction via the FAA eLMS, which will allow Web-based exercises to be accurately graded and validation metrics captured.

Booz Allen will walk through the course as described in DID-14 and DID-15, as outlined in FAA-STD-028C's Figure 10-2: Validation Process for Course Materials table, by presenting a detailed course schedule, detailed course outline, and complete draft lessons to representatives of the target population. This will determine if the instructional approach is appropriate and effective, test items and time allocations are appropriate, and the format of the materials is easy to use. After receipt of FAA comments, Booz Allen will write and submit a summary report to the FAA.

Output(s):

- Instructional Materials (DIDs-8 – 13) (Future deliverable)
- Contractor Presentation of Course (DID-14) (Future deliverable)
- Operational Tryout (DID-15) (Future deliverable).

Phase 4: Delivery

Purpose: In the delivery phase, the contractor presents training to the target population and delivers final products to the FAA.

Delivery of training is both Web-based and in a classroom environment using standard classroom facilities including an overhead projector (from a laptop or desktop computer), whiteboards, flip charts, and TMA equipment. The maximum training group size is 15 students.

Appendix D: Course Duration shows the estimated course duration. This appendix identifies the sequence and timing of the training. The appendix will be updated as decisions about the course sequence are made with the SMEs and course manager/instructor.

Output(s):

- First Course Conduct (DID-16) (Future deliverable)
- Final Products (TDP and CDG will be delivered; all other outputs are considered future deliverables).

Phase 5: Evaluation

Evaluation is indicated in FAA STD 028C as an FAA function and will not be addressed in this TDP.

2.5 MEDIA SELECTION ANALYSIS

The media selection analysis is included in Attachment D – Media Analysis.

2.6 Rationale for recommended training approach for each course

Several training approaches have been identified as appropriate for the delivery of TMA training. While these are separate training approaches, each TMA curriculum may include a blend of training approaches, depending upon the individual learning activity requirements per audience. The final training approach for each curriculum will be detailed in the CDG. These approaches are detailed in Table 5.

Table 5 – Learning Approaches

Approach	Description
Instructor-Led Classroom Training	Will be used when in person interaction is required for group discussion and hands-on equipment training Note: Classroom delivery may include multimedia, such as video, simulations, and computer graphics
Web-Based Training	Will be used to teach basic TMA concepts and buttonology for large numbers of geographically dispersed personnel
Scenario-Based Labs	Will be used to practice on TMA equipment or under realistic job conditions. This practice may be used to refine cognitive or motor skills or to integrate the performance of many tasks

Classroom training will be conducted at FAA facilities and offers the opportunity for the audience to collaborate and learn collectively from one another. Additionally, it provides the opportunity for learners to ask questions to the instructor for real-time answers on how to use TMA. Additional detail on the rationale for instructor-led classroom training is available in Table 6.

Table 6 – Rationale for Instructor-Led Classroom Training

Category	Rationale
Cost to Develop (or limitations imposed by cost)	The cost to develop will be based on the final curriculum organization in the CDG
Time to Develop	The time to develop will be based on the final curriculum organization in the CDG
Ease of Distribution of the Training	Learners are required to travel to FAA facilities where instructor-led classroom training is being conducted

Category	Rationale
Requirement for Learner/Instructor Interaction	Learners will be required to complete all instructor-led training for their curriculum in accordance with the completion criteria. The Government Program Manager will have the authority to direct, schedule, and manage the training. The Course Manager or Instructor will collect course completion statistics and evaluation data. Learners are required to interact with Instructors and other learners during learning activities
Requirement for Hands-On Activity	Learners are required to complete hands-on interactions as required by the learning activity.
Availability of Infrastructure	Learners are required to access Government facilities for instructor-led classroom training attendance

Because of the large number of geographically dispersed learners, WBT will be used to teach the most common aspects of TMA. WBT will be available to the learner at a time and location convenient to them and accessible through eLMS. Additional detail on the rationale for WBT is available in Table 7.

Table 7 – Rationale for Web-Based Training

Category	Rationale
Cost to Develop (or limitations imposed by cost)	The cost to develop will be based on the final curriculum organization in the CDG
Time to Develop	The time to develop will be based on the final curriculum organization in the CDG
Ease of Distribution of the Training	WBT developed for FAA will be distributable through eLMS and will adhere to the specifications included in the FAA eLearning Design and Style Guide and Content Integration Guide
Requirement for Learner/Instructor Interaction	Learner will be required to complete all WBT for their curriculum in accordance with the completion criteria. The Government Program Manager will have the authority to direct, schedule, and manage the training. The Course Manager or Instructor will collect course completion statistics and evaluation data
Requirement for Hands-On Activity	Learners are required to access WBT, which includes hands-on interactive simulations and exploratory scenarios
Availability of Infrastructure	Learners are required to access government computer workstations capable of eLMS access

Because of the complexity of TMA, it will be necessary for certain audiences to have hands-on experience with TMA as part of their curriculum. By providing guided practice on the equipment in a lab environment, learners will be able to work directly with an instructor to apply their knowledge of TMA in response to performance-based

objectives. Additional detail on the rationale for scenario-based labs is available in Table 8.

Table 8 – Rationale for Scenario-Based Labs

Category	Rationale
Cost to Develop (or limitations imposed by cost)	The cost to develop will be based on the final curriculum organization in the CDG
Time to Develop	The time to develop will be based on the final curriculum organization in the CDG
Ease of Distribution of the Training	Learners are required to travel to FAA facilities where scenario-based lab training is being conducted
Requirement for Learner/Instructor Interaction	Learners will be required to complete all scenario-based lab training for their curriculum in accordance with the completion criteria. The Government Program Manager will have the authority to direct, schedule, and manage the training. The Course Manager or Instructor will collect course completion statistics and evaluation data. Learners are required to interact with Instructors and other learners during scenario activities
Requirement for Hands-On Activity	Learners are required to access TMA equipment in a support lab for the completion of the learning activity
Availability of Infrastructure	Learners are required to access FAA support labs which are equipped with TMA equipment

3 Management

3.1 Quality Assurance Provisions

For a development effort of this size and timeframe, it is imperative that there are quality assurance (QA) provisions in place to ensure that consistent instructional materials are developed on time and within budget.

Throughout the phases of the systematic training development process, there will be multiple validations of products through contractor-government touch points as depicted in Figure 2.

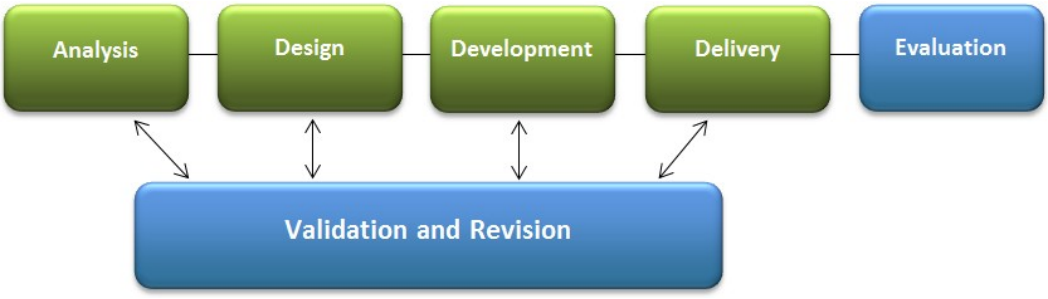

Figure 2 – Systematic Training Development Validation & Revision Process by Phase

Each proposed training module will be broken down into individual lessons and developed at the lesson level. The lesson development process includes both internal Booz Allen quality assurance controls and government review quality assurance controls.

The development process includes a draft version and final version for each document produced. The Government will review each draft version and provide comments and changes to Booz Allen for incorporation into the final document. The Government will then review the final document to ensure all required changes have been made.

The Government will conduct the final reviews. FAA personnel, including the SME(s) and the Management Point of Contact (POC) assigned to this development effort, will perform these reviews to ensure that the materials are ready for use.

In addition to the document reviews during production, an operational tryout will be conducted to ensure the consistency of the course across all content modules and a full understanding of all instructor requirements prior to conducting the pilot. The operational tryout will be presented by the instructors to a select audience. Booz Allen and the FAA will observe the tryout and record any comments. Necessary

changes will be identified and incorporated into the materials prior to initial course conduct.

The initial course conduct for the intended training audience will also be observed by Booz Allen and recommendations for changes will be identified and incorporated into the final materials.

By conducting these reviews, the project team will ensure that the final product is instructionally sound and technically correct.

3.2 ASSUMPTIONS UPON WHICH THE SUCCESS OF THE TRAINING DEVELOPMENT DEPENDS

It was necessary to make several general assumptions in order to select the most appropriate instructional strategy and methods presented in this document. These assumptions were:

- FAA SMEs will be readily available for content gathering and material review
- FAA SMEs will review the materials and provide consolidated comments for incorporation into the courseware within the schedule's timeframe
- Appropriate online programmed files will be developed for each WBT module.
- The classroom infrastructure supports delivery of multimedia in the classroom by the instructor
- Materials will be built for a standard classroom configuration with computer and projection systems using Microsoft PowerPoint
- High fidelity simulation labs may be required for some modules of this training
- TMA 3.12.0 equipment will be available to the training development team throughout the training lifecycle
- Facilitators have the skills and experience to teach in the classroom and virtually
- The training material will be designed to the TMA Operator's Manual version 3.12.0 and TMA software 3.12.0
- Procedures published after the delivery of the CDG may result in the need for additional analysis or re-design.

3.3 OSHA REGULATIONS APPLICABLE TO THE TASKS

Not applicable.

3.4 HARDWARE AND/OR INTERFACE REQUIREMENTS

The hardware and interface requirements will follow the guidelines set forth in the following documents:

- FAA eLearning Design and Style Guide
- FAA Section 508 Policy for e-Learning
- FAA Section 508 Standards and Guidelines for eLearning
- Digital Video Production and Distribution Recommendations In Support of Training for FAA.

Accordingly, the CDG will ensure that the course design and development:

- Adheres to Section 508 and SCORM 1.2 compliance
- Uses operating system Windows versions XP and higher
- Establishes a standard screen resolution of 1024 x 760
- Includes color depth 16 bit
- Conforms with:
    - Internet Explorer 6.0 (or higher)
        - Java Sun JRE with JVM vs. 1.4.2 or later
        - Shockwave 8.0 – 10.0
    - Macromedia Flash Player 9.0 or higher (to include H.264 codecs)
    - Windows Media 11.0 (or higher)
    - PowerPoint Player
- Defaults to Apple Mac system requirements for MAC Intel based SAFARI and Firefox browsers
- Follows best practices to indicate audio formats for MAC and Microsoft Windows delivery requirements
- Uploads to the Department of Transportation's eLMS content server
- Plans for student access to and interface with the TMA support labs.

3.5 FAA RESOURCES NEEDED TO DEVELOP/DELIVER THE TRAINING

In order to deliver the training, Booz Allen will need the provision of and/or access to the following FAA resources:

- FAA SMEs, including TMA SMEs

- FAA classroom training facilities with multimedia capabilities, personal computers, access to the internet, and printers
- FAA support labs with access to the TMA support string, and high fidelity simulation/interaction capabilities
- Any requested GFI
- Content Integration Team (CIT)
- FAA e-Learning Representative (eLRep)
- TMA version 3.12.0 equipment
- System Administrator to assist with TMA operation and capture of training materials (i.e., screen shots)
- Facilitators with TMA knowledge and experience, classroom teaching skills and experience, and Web-based teaching skills and experience.

3.6 Issues and concerns

At present, there are no identified issues or concerns that would impact the development of this course. Booz Allen will promptly address any issues that arise in the weekly teleconference meetings with FAA management and SME POCs in addition to recording them on monthly status reports.

3.7 Project milestone schedule

Appendix E: Draft Project Schedule contains a draft project schedule for the development and delivery of the TMA curricula. The schedule includes, for each deliverable, the time allowed for:

- Contractor development
- FAA SME review
- Revisions by the contractor
- Submission of final version.

3.8 Funding requirements and cost analysis

The funding requirements and cost analysis are initial estimates based on the development of this TDP, which include the development of 5 days ILT and 4 hours of WBT tailored into multiple curricula. These estimates are subject to change based on the final CDG.

Table 9 – Estimate Level of Effort for TMA Training Development

FTE	Name	Labor Category / Level	YR 1	Total
0.15	TBD	Program Manager Level 3	300	300
1.0	TBD	Trainer Level 6	1920	1920

FTE	Name	Labor Category / Level	YR 1	Total
1.0	TBD	Trainer Level 6	1920	1920
1.0	TBD	Trainer Level 6	1920	1920
0.5	TBD	ATC Specialist Level 2	1200	1200
0.1	TBD	ATC Specialist Level 2	200	200
0.5	TBD	Web Designer Level 6	800	800
0.2	TBD	Web Designer Level 6	400	400
		Total Level of Effort Based on TDP	**8660**	**8660**

4 Supplementary Information

4.1 List of acronyms

See Appendix A: Acronym List.

4.2 List of abbreviations

See Appendix B: Abbreviations and Glossary of Terms.

4.3 Glossary of terms

See Appendix B: Abbreviations and Glossary of Terms.

4.4 Index

See Appendix B: Abbreviations and Glossary of Terms and the Table of Contents associated with this document.

4.5 Supporting material

TDP Attachment A – GFI List

TDP Attachment B – Curriculum Organization

TDP Attachment C – Analysis Data

TDP Attachment D – Media Analysis

Appendix A: Acronym List

Appendix B: Abbreviations and Glossary of Terms

Appendix C: Course Map

Appendix D: Course Duration

Appendix E: Draft Project Schedule

Appendix F: FAA Analysis Synopsis

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Appendix A: Acronym List

This appendix includes acronyms that both appear in this TDP, and may appear in the final developed courseware.

AAR	Airport Acceptance Rate
AC	Aircraft
ACDF	Adjacent Center Data Feed
ACID	Aircraft Identifier
ACM	Adjacent Center Metering
ADIF	ARTS Data Interface
AGW	ARTS Gateway
AID	Aircraft ID
AMDT	Amount Maximum Delay Time
ARC	Ames Research Center
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASP	Arrival Spacing Program
AT	Air Traffic
ATC	Air Traffic Control
ATCS	Air Traffic Control Specialist
ATCSCC	Air Traffic Control System Command Center
ATCT	Air Traffic Control Tower
ATL	Atlanta
ATM	Air Traffic Management
ATO-E	FAA TMA Program Office
BWM	Bandwidth Manager

CAP	Collaborative Arrival Planning
CFX	TMA Meter Fix
CHI	Computer-Human Interface
CID	Enhanced Aircraft Identification
CIT	Content Integration Team
CM	Communications Manager
CMS	Common Message Set
Config	Configuration
COTS	Commercial Off-the-Shelf
CPC	Certified Professional Controller
CPU	Central Processing Unit
CREWS	CTAS Remote Weather System
CREWS	TMA Remote Weather System
CSC	Computer Sciences Corporation
CTAS	Center Terminal Radar Approach Control (TRACON) Automation System
CURR	Current
Def	Default
DEN	Denver
DEP	Departure
DFW	Dallas/Fort Worth
DP	Dynamic Planner
DSP	Departure Spacing Program
DSR	Display System Replacement
DYSIM	Dynamic Simulation
EDC	En Route Departure Capability

EDCT	Estimated Departure Clearance Time
eLMS	Electronic Learning Management System
eLRep	e-Learning Representative
ELO	Enabling Learning Objective
ERAM	En Route Automation Modernization
ESP	En Route Sequencing Program
ETA	Estimated Time of Arrival
ETMS	Enhanced Traffic Management System
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FAV	Fixed Area Volume
FDAD	Full Digital Arts Display
FDB	Flight Data Block
FP	Flight Plan
FPA	Fix Posting Area
GDP	Ground Delay Program
GFI	Government Furnished Information
GUI	Graphical User Interface
HADDS	HOST ATM Data Distribution System
HCS	Host Computer System
HDIF	HADDS Data Interface
HID	Host Interface Device
HJ	Heavy Jets
HNL	Host Interface Device - National Airspace System LAN

ICD	Interface Control Document
ID	Identifier
ISM	Input Source Manager
LAX	Los Angeles
LJ	Light Jets
LT	Standard Turbo
M&C	Monitor & Control
MFA	Meter Fix Arc
MFX	Meter Fix
MIN	Minutes
MiT	Miles-in-Trail
MMG	Multi Metering Gateway
MMGI	Multi Metering Gateway Interface
MMP	Multiple Meter Points
MP	Meter Point
MPG	Meter Point Group
NAPRS	National Airspace Performance Reporting System
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NextGen	Next Generation Air Transportation System
NFDC	National Flight Data Center
NGIP	NextGen Implementation Plan
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service

O3A	Outer-Three Arc
O3P	Outer-Three Point
O4A	Outer-Four Arc
O4P	Outer-Four Point
OE	Operating Environment
OEP	Operational Evolution Partnership
OMA	Outer Arc (or Outer Meter Arc)
OMA	Outer Meter Arc
OOA	Outer Outer Arc
OOOA	Outer Outer Outer Arc
OOP	Outer-Outer Point
OP	Outer Point
OPS	Operational String
ORD	Operational Requirements Document
Orig	Original
OS	Operating System
OSF	Open Software Foundation
PAR	Preferential Arrival Route
PDR	Preferential Departure Route
PGUI	Planview Graphical User Interface
PR	Priority
PVD	Planview Display
RA	Route Analyzer
RDAR	Preferential Departure and Arrival Route
RUC	Rapid Update Cycle (winds)

RWY	Runway
S/SDD	System/Subsystem Design Description
SAR	System Analysis Recording
SBL	Scenario Based Lab
SCM	Single Center Metering
SCORM	Sharable Content Object Reference Model
SGFF	Single Gate Free Flow
SMC	System Monitor and Control (Custom)
SME	Subject Matter Expert
SO	Schedulable Objects
SOW	Statement of Work
SP	Standard Propeller
SSC	Super Stream Class
SSS	System/Subsystem Specification Document
ST	Standard Turbo
STA	Scheduled Time of Arrival
STARS	Standard Terminal Automation Replacement System
STD	Standard Time of Departure
SUA	Special Use Airspace
TAR	TRACON Acceptance Rate
TBD	To Be Determined
TBFM	Time Based Flow Management
TBM	Time Based Metering
TCL	Technical Content Lead
TDL	Training Development Lead
TDP	Training Development Plan

TEC	Tower En Route Control
TFM	Traffic Flow Management
TFMS	Traffic Flow Management System
TGUI	Timeline Graphical User Interface
TGUI	Timeline GUI
THD	Threshold
TLO	Terminal Learning Objective
TMA	Traffic Management Advisor
TMC	Traffic Management Coordinator
TMI	Traffic Management Initiative
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control Facility
TS	Trajectory Synthesizer
UR	Unrestricted
URET	User Request Evaluation Tool
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omnidirectional Range
WBT	Web-based training
WDPD	Weather Data Processing Daemon
WJHTC	William J. Hughes Technical Center
WX	Weather Data Acquisition & Processing
ZAB	Albuquerque ARTCC

ZAU	Chicago ARTCC
ZBW	Boston ARTCC
ZDC	Washington ARTCC
ZDV	Denver ARTCC
ZFW	Fort Worth ARTCC
ZHU	Houston ARTCC
ZID	Indianapolis ARTCC
ZJX	Jacksonville ARTCC
ZKC	Kansas City ARTCC
ZLA	Los Angeles ARTCC
ZLC	Salt Lake ARTCC
ZMA	Miami ARTCC
ZME	Memphis ARTCC
ZMP	Minneapolis ARTCC
ZNY	New York ARTCC
ZOA	Oakland ARTCC
ZOB	Cleveland ARTCC
ZSE	Seattle ARTCC
ZTL	Atlanta ARTCC

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Appendix B: Abbreviations and Glossary of Terms

This appendix includes abbreviations and glossary terms that both appear in this TDP, and may appear in the final developed courseware.

AAR	Airport Acceptance Rate. A dynamic input parameter specifying the number of arriving aircraft which an airport or airspace can accept from the ARTCC per hour. AAR is used to calculate the desired interval between successive arrival aircraft.
AAS	Advanced Automation System
ACID	Aircraft Identification
AID	Aircraft Identification
ACLT	Actual Calculated Landing Time, the ASP equivalent of TMA threshold STA (scheduled time of arrival). This time is frozen and will not be updated in response the aircraft‘s progress.
Active track	Describes an aircraft for which radar data has been received.
ADG	ARTS Data Gatherer—component that collects radar information from ARTS.
AN	The standalone TMA analysis tool
ARTCC	Air Route Traffic Control Center (also called —Center‖). Has the responsibility for the enroute portion of IFR flights.
ARTS	Automated Radar Terminal System. Semi-automated air traffic control systems using Univac computers that are programmed to terminal radar facilities of varying intensities and complexities. The tracking system tracks beacon-equipped aircraft and uses a PVD which is equipped with indicator controls, tracked and untracked targets, system data area, tabular lists, and video map. Manual input comes from trackball, keyboard, and quick-look keys. Besides the display, output can go to a

	printer. It participates in the automatic interfacility exchange of flight data.
ASD	Aircraft Situational Display
ASP	Arrival Sequencing Program
ATC	Air Traffic Control
Autoswap	Autoswap provides the capability that allows aircraft that are in a holding pattern to be prioritized based on the order that they enter holding.
Beacon code	The 4-digit identifier generated by the ATC computer and assigned to an aircraft by ATC. (Also called Mode-A transponder code or squawk code.) Used to associate radar returns with a particular aircraft.
Blocked time interval	A relatively large block of time (multiple slots) reserved for departures or temporary closure of a runway or feeder gate. Aircraft within such an interval and going to the specified runways or feeder gates are not allowed to have an STA.
Blocked time slot	A relatively small chunk of time reserved for the arrival of a single aircraft. This may be an aircraft that is not yet tracked by the radar, such as an aircraft below radar or one originating at a nearby feeder airport. The amount of time required to be set aside is automatically scaled by the size class of the aircraft.
Broadcast	Whenever TMA schedules an aircraft, it broadcasts (sends) the aircraft arrival information to the appropriate ATC sector positions. The scheduling information includes scheduled arrival time and delay time. This information is broadcast to the sectors primarily for display in the metering list on the sector planview display.
CAP	Collaborative Arrival Planning server provides a high level interface to external clients to receive TMA-derived information. CAP is controlled from the M&C and it will connect to the CM process and receive messages similar in nature to RA, DP, and the GUIs including flight plans, tracks, ETAs, STAs, external

	interface status, configuration information and metering status information.
CAS	Calibrated airspeed
Center	Air Route Traffic Control Center (also called ARTCC). Has the responsibility for the enroute portion of IFR flights.
CM	Communications Manager (program module of the TMA system)
Coordination fix	The position at which an aircraft transitions from one ARTCC to another (analogous to a handoff).
Conflict	Refers to a separation violation. Potential conflicts that can be anticipated by the computer using predicted aircraft positions.
Controller	A person authorized to provide air traffic control service. In direct communication with the aircraft and issuing advisories and commands directly to the pilots. (Compare Traffic Manager Coordinator.)
Corner Post	Equivalent to feeder gate.
Datablock	Refers to the display tag that conveys information such as aircraft id, altitude, and speed on a FAST or PGUI screen.
Delay time	The amount of time that the arriving aircraft must lose to cross the reference (usually, the meter fix) at the assigned crossing
Departure aircraft	Aircraft departing the primary airport with an intended landing at an airport beyond the boundaries of Center airspace. (Compare Satellite departure aircraft.)
DME	Distance measuring equipment
DP	Dynamic Planner. TMA program that generates scheduled times for the arrival traffic.
Display	An optional arc where ETA and STA may be displayed.

Point	ETA and STA at the Display Point are based on a calculated schedule referenced to the Meter Point.
DSP	Departure Sequencing Program
Dwell	To leave the pointer at an on-screen location without clicking the mouse buttons.
EDC	En Route Departure Capability. EDC is an enhancement of TMA that extends its architecture to manage en route traffic flows exiting an ARTCC to an adjacent ARTCC.
EPR	Engine Pressure Ratio (TS term)
EDA	En Route Descent Advisor. A suite of processors that generates clearances for the enroute controllers handling arrival flows to meter gates. EDA clearances ensure fuel-efficient and conflict-free descents to the meter gates at specified crossing times. Another component of EDA includes overflight, arrival, and departure trajectory analysis. The EDA Tool displays information about pairs of aircraft predicted to be in conflict. In addition to conflict probability analysis, EDA also offers trial planning features to aid controllers in conflict resolution. This tool is used for transitional airspace operations.
ERM	Enroute Metering Program
ETA	Estimated Time of Arrival. This is the time at which the aircraft is estimated to cross the runway threshold (or any other specified point). The ETA is determined without any restrictions imposed by other aircraft. 1. A non-radar-based ETA is derived from an aircraft‘s flight plan. It is used until the aircraft is tracked by radar. 2. A radar-based ETA is computed based on the aircraft‘s current position and velocity estimates given by the surveillance speed, altitude profile of the aircraft to the threshold, and the projected wind.

3. (FAA Pilot/Controller Glossary) This is the time the flight is estimated to arrive at the gate (scheduled operators) or the actual runway on-times for nonscheduled operators.

ETD	Estimated Time of Departure. This is the time at which the aircraft is estimated to depart the runway. The ETD is derived from an aircraft‘s flight plan.
FAA	Federal Aviation Administration
FAATC	Federal Aviation Administration Technical Center
FAF	Final Approach Fix
FAST	Final Approach Spacing Tool. TMA software that provides the TRACON radar controllers with advisories to assist in sequencing and spacing arrival aircraft from the TRACON boundary to hand-off to the air traffic control tower. It takes the form of a planview display.
FCFS	First-Come-First-Served (scheduling method)
FDAD	Full Digital ARTS Display (familiar radar screen, console with trackball) functioning as a controller station, where ARTS is a beacon-tracking system designed for TRACONs, providing the capability to decode beacon data and display symbology such as selected codes and special position identifications.
Feeder fix	1. (TMA) Currently equivalent to metering fix. (All metering fixes are feeder fixes; not all feeder fixes are metering fixes.) 2. (FAA Pilot/Controller Glossary) The fix depicted on Instrument Approach Procedure Charts which establishes the starting point of the feeder route.
Feeder gate	(TMA) An approach area through which a large amount of air traffic is funneled down into a TRACON. A typical configuration has four feeder gates (called corner posts) distributed evenly around the congested TRACON airspace. See the FAST Procedure Summaries, “Section 1.1 The ATC Environment.‖

FIR	Flight Information Region. Airspace of defined dimensions within which Flight Information Service and Alerting Service are provided. Loosely: the geographical ―footprint‖ of the ATC facility in question.
F-keys	Function Keys. Labeled ―F1‖ through F12‖ on standard keyboards.
Flow rate	The number of arrivals per hour based on a traffic count.
FMS	Flight Management System. An onboard computer system that helps in flight planning, navigation, and performance management. It uses a large database (of aircraft performance data and airspace data) that is accessed for the aircraft's control and navigation system.
Freeze horizon	The time at which an aircraft's STA becomes frozen and the aircraft is transferred from the schedulable list to the frozen-STAs list. An aircraft is added to this list when its flight time to a certain point (landing or metering fix) first becomes less than the freeze horizon. (Compare scheduling horizon.)
FTA	Fastest Time of Arrival
Gate	1. (TMA) An arrival or feeder gate is an area of airspace that funnels traffic down to the airport; it starts wide and gets narrow. It can include one or more approach fixes depicted on published instrument approach procedures and charts, through which aircraft will be metered prior to entering terminal air space. For example, a fix for heavy and large aircraft might be coupled with a fix for small aircraft; jointly they would be considered, for example, the northeast feeder gate. 2. In commercial operations, the entry for passengers and staff to the aircraft operations area.
Geopolitical Boundary	A set of map boundaries pertaining to geographical and political areas including but not limited to state lines,

	lakes, mountain ranges, and major highways.
GMT	Greenwich Mean Time (See UTC)
GUI	Graphical User Interface (generic)
ID	Identification
IAS	Indicated Airspeed
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
ISM	Input Source Manager
Load Graph Display	Plots the number of aircraft predicted to cross a specified reference point (runway threshold, final approach fix, or feeder gate) within a specified amount of time.
Meter Fix Arc (Outer Meter Fix Arc)	A predetermined arc, usually set at the same distance from Meter Fix as the Outer Fix, for which crossing times are calculated, when an aircraft will not travel over an outer fix.
Metering Fix	A fix along an established route where aircraft metering begins in anticipation of the aircraft entering terminal airspace. Normally, this fix is established 10,000 feet above airport elevation at a distance from the airport that will facilitate a profile descent to that airport.
Meter Point	A term referring to a waypoint used when running TMA in EDC mode. A meter point is a point at which EDC will deconflict aircraft outbound from the Center. When adapted, the Meter Point is used to provide an ETA and STA referenced to the intersection of the aircraft route with the meter point.
Min/MIN	Minutes
Minimum time-to-landing	The earliest time an aircraft can arrive at the runway from its current location and altitude. It is used by the TMA scheduler to determine the earliest feasible time

	an aircraft can be scheduled to land.
MFT	Meter Fix Crossing Time (ASP)
Nmi	Nautical miles
NAS	National Airspace System. The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations, and procedures, technical information, manpower, and materials. Included are system components shared jointly with the military.
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration, U.S. Department of Commerce
OETA	Original Estimated Time of Arrival. The first valid ETA estimate obtained when an arrival aircraft is first tracked by radar upon penetrating the airspace under consideration.
Outer Meter Arc	An arc that is an adjustable distance (on the order of 50 nmi) from the metering fix. The TMA scheduler calculates aircraft arrival times at the outer meter arc and at the metering fix with the intent to have most of the delay absorbed by the time the aircraft reaches the meter fix. Do not confuse outer meter arc with outer marker, a marker beacon at or near the glideslope intercept altitude of an ILS approach. The OM is normally located 4 to 7 miles from the runway threshold on the extended centerline of the runway.
OFT	Outer Fix Time
OM	Outer marker. A marker beacon at or near the glideslope intercept altitude of an ILS approach. The OM is located approximately 4 to 7 miles from the runway threshold on the extended centerline of the runway.

Outer-Outer Point	An arc defined in adaptation with both range and angular extent, referenced to a Meter Point. When adapted, the Outer-Outer Point is used to provide an ETA and STA referenced to the intersection of the aircraft route with Outer-Outer Point.
Outer Point	An arc defined in adaptation with both range and angular extent, referenced to a Meter Point. When adapted, the Outer Point is used to provide an ETA and STA referenced to the intersection of the aircraft route with the Outer Point.
Outer-Three Arc	An arc defined in adaptation with both range and angular extent referenced to an Outer-Outer Arc. When adapted, the Outer-Three Arc is used to provide an ETA and STA referenced to the intersection of the aircraft route with the Outer-Outer Arc.
Outer –Four Arc	An arc defined in adaptation with both range and angular extent referenced to an Outer-Outer Arc. When adapted, the Outer-Four Arc is used to provide an ETA and STA referenced to the intersection of the aircraft route with the Outer-Outer Arc.
Outer-Three Point	An arc defined in adaptation with both range and angular extent, referenced to an Outer-Outer Point. When adapted, the Outer-Three Point is used to provide an ETA and STA referenced to the intersection of the aircraft route with the Outer-Outer Point.
Outer-Four Point	An arc defined in adaptation with both range and angular extent, referenced to an Outer-Outer Point. When adapted, the Outer-Four Point is used to provide an ETA and STA referenced to the intersection of the aircraft route with the Outer-Outer Point.
PFS	Profile Selector (program module of the TMA system)
PGUI	Planview Graphical User Interface. A TMA user interface that provides a planview display designed for use by controllers and developers in conjunction with the TMA or pFAST software. The PGUI is a user-customizable display providing a communication link through the CM, and allowing display of advisories,

	aircraft route information, and research data.
Pointer	The movable indicator on a computer screen. The pointer can be relocated on screen by moving the connected computer mouse, track or slew ball.
Preferred IFR Routes	Routes established to increase system efficiency and capacity. They normally extend through one or more ARTCCs and are designed to organize and balance traffic flows. IFR clearances are issued on the basis of these routes, except when severe weather avoidance procedures or other factors dictate. Preferred IFR routes are correlated with SIDs and STARs and may be defined by some combination of airways, jet routes, direct routes between navaids, and waypoints.
PVD	Plan View Display (generic). A computer-generated representation that reflects a given airspace and provides a bird‘s-eye view of the airspace, its features (such as intersections and routes), and the air traffic within the airspace.
Quick Keys	Keyboard commands assigned to specific TMA functionality.
RA	Route Analyzer. The TMA software tool that generates aircraft estimated times of arrivals, factoring in radar returns, weather, etc. (program module of the TMA system).
RAR	Runway Acceptance Rate
Rush Alert	Uses a pair of red brackets on a timelines (and/or a flashing red ball) to indicate when the number of aircraft will exceed the maximum airport acceptance rate (or TMC-specified value).
Satellite Airports	Airports that lie within the airspace of a single ARTCC. Usually used in the sense of airports from which aircraft are departing to arrive at the TMA hub airport without going to another air traffic control center.

Satellite Departure Aircraft	Aircraft departing the primary airport with an intended landing at an airport within the boundaries of Center airspace. (Compare Departure aircraft.)
Schedule	The TMA definition is the specific sequence and the corresponding times in which each aircraft shall cross the runway threshold or any other point of reference. It does not refer to the airline‘s schedule.
Scheduler	TMA software that generates schedules for the schedulable list of aircraft; that is, when an aircraft in the list receives an updated ETA, when a new aircraft is added to the list, or when the TMC makes parameter changes. Thus, the STA of an aircraft in the scheduling window is subject to revision until it passes the freeze horizon.
Scheduling	Refers to the process of determining the sequencing and times at which aircraft should cross the runway threshold or other specified point. Automatic scheduling is performed by the scheduler.
Sequencing	A generic term that includes ordering of aircraft along a common path.
SD	Situation Display
SID	Standard Instrument Departure
STA	Scheduled Time of Arrival. An STA is the desired time that an aircraft should cross a certain point (landing or metering fix). It takes other traffic and airspace configuration into account. An STA time shows the results of the TMA scheduler that has calculated an arrival time according to parameters such as optimized spacing, aircraft performance, and weather.
STAR	Standard Terminal Arrival Route. A preplanned IFR air traffic control arrival procedure published in graphic and/or text form. STARs provide transition from the enroute structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area.

Stream Class	A particular flow of traffic into a TRACON. For example, all jets through one feeder gate are one stream class; all jets through a different feeder gate are another; all turboprops and pistons through one feeder gate are another; etc. Within a stream class, all aircraft must maintain a specified minimum in-trail separation at the feeder gate. For aircraft in different stream classes, there are no in-trail separation requirements at the feeder gate; they are assumed to be horizontally and/or vertically separated.
SUA	Special Use Airspace. SUAs are defined as airspace wherein limitations may be imposed upon aircraft operations. Examples of SUA areas are: • Prohibited Areas • Restricted Areas • Military Operations Areas (MOA) • Warning Areas • Alert Areas • Controlled Firing Areas (CFA) • National Security Areas (NSA)
symbolic data	Any non-alphanumeric character such as @, #, and ~, acting as a visual reference to a specific meaning.
TAR	TRACON Acceptance Rate
TATCA	Terminal Air Traffic Control Automation. Refers to the FAA program leading to a near-term national implementation of terminal ATC automation functions prior to implementation of the Advanced Automation System (AAS).
Time-to-landing	The remaining flight time until an aircraft is predicted to cross the runway threshold.
TFMS	Traffic Flow Management System. TFMS provides information processing support for Federal Aviation Administration (FAA) traffic management personnel as

	they coordinate the use of the National Airspace System (NAS) and respond to conditions of excess demand. TFMS receives information on planned and active flights, generates forecasts of demand from current time to several hours ahead, presents this information to Traffic Management Personnel, and provides automation support to the traffic management initiatives to resolve or ameliorate congestion.
TGUI	TMA's Graphical User Interface. It takes the form of the time-lines display (program module of the TMA system).
TMA	Traffic Management Advisor (software). One of the three major packages of TMA, TMA generates runway assignments, landing sequences, and landing times for aircraft arriving in Center airspace down to hand-off to the TRACONs. It also assists in runway configuration control and flow management. In the TRACON, TMA alerts the controllers to what's coming and also puts missed approach aircraft and unanticipated arrivals into an orderly sequence.
TMC	Traffic Management Coordinator. A traffic management coordinator balances traffic flows within an ARTCC in accordance with national flow directives and terminal capabilities. There are also TMCs working the terminal environment in order to balance the flow of arrival, departure, and tower-enroute aircraft by ensuring that traffic demand does not exceed operational acceptable levels of traffic.
TMS	Traffic Management System (FAA procedural). The Traffic Management System (TMS) mission is the balancing of air traffic demand with system capacity to ensure maximum efficiency in the utilization for the total National Airspace System (NAS), thereby, producing a safe, orderly, and expeditious flow of traffic while minimizing delays. The TMS supports the primary air traffic control mission of separation by providing a more disciplined flow of traffic, whereby aircraft are spaced properly and peaking is reduced. (FAA ATC Handbook 7210.3K)
TMU	Traffic Management Unit. The TMU manages the flow of air traffic throughout the national airspace to achieve

	the optimum use of the navigable airspace and to minimize the effect of air traffic delays on the user without exceeding operational acceptable levels of traffic.
TRACON	Terminal Radar Approach Control Facility. Concerned with the approach and departure portions of IFR flights in relation to a major airport.
Traffic Count	Provides a count of aircraft expected and planned to be at the threshold and crossing the feeder gate in 10, 15, and 20-minute intervals. The display is a printable table overlay.
TTL	Time to land
TS	Trajectory Synthesizer (program module of the TMA system)
UTC	Coordinated Universal Time; also called Zulu time (formerly GMT, Greenwich Mean Time)
Vertex	Last fix adapted on the arrival speed segments. Normally, it is the outer marker of the runway in use. However, it may be the actual threshold or another common point on the approach path for the particular runway configuration. Term used by ASP. (FAA Pilot/Controller Glossary) A vertex is a single reference point. It can be a reference to an airport or a set of runways.
VAR	Vertex Acceptance Rate
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VTA	Vertex Time of Arrival, a calculated time of arrival over the adapted vertex for the runway configuration in use. The time is calculated via the optimum flight path using adapted speed segments.

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Appendix C: Course Map

The course maps are located in Attachment B – Curriculum Organization.

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Appendix D: Course Duration

The CDG will include a schedule with an overview of the course chronology. The major course segments will be outlined in the CDG and reflected in the schedule's details. The estimated hours of instruction for each course are shown in Table D-1. The WBT, ILT, and scenario-based lab (SBL) estimates are based upon this TDP and may change according to the final CDG.

Table D- – Course Duration

Course	Instructional Method	Estimated Hours of Instruction
Cadre	WBT	4 Hours
	ILT	16 Hours
	SBL	16 Hours
TMC En Route/ATCSCC	WBT	4 Hours
	ILT delivered by Cadre	16 Hours
TMC Terminal	WBT	4 Hours
CPC En Route	WBT	2 Hours
CPC Terminal	WBT	1.5 Hours
Academy TMC	WBT	1 Hour
Academy ATCS	WBT	1 Hour

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Appendix E: Draft Project Schedule

The draft project schedule represents the high level process used to develop TMA training. Some tasks in this schedule will occur simultaneously and others may have predecessors. This schedule is notional and will be finalized in the final CDG.

Table E- – Draft Project Schedule

Tasks	Notional Duration in Days
Conduct Kickoff Meeting	3
Identify SMEs	1
Develop Draft Instructor-Led Materials	
Develop Draft Course Schedules	25
Develop Draft Instructor Guides & Presentation Materials	53
Develop Draft Student Guides	53
Conduct Peer Review	2
Conduct SME Review	5
Submit Draft Course Schedules	1
Submit Draft Instructor Guides	1
Submit Draft Student Guides	1
Develop Final Instructor-Led Materials	
Develop Final Course Schedules	25
Develop Final Instructor Guides & Presentation Materials	33
Develop Final Student Guides	33
Conduct Peer Review	2
Conduct SME Review	5
Submit Final Course Schedules	1
Submit Final Instructor Guides	1
Submit Final Student Guides	1
Develop WBT Prototype	
Develop Draft Prototype	30
Test Prototype on eLMS with the FAA Content Integration Team	5
Revise Prototype	5
Submit Draft Prototype	1
Develop Final Prototype	15
Test Prototype on eLMS with the FAA Content Integration Team	3
Revise Prototype	2
Submit Final Prototype	1
Develop WBT Storyboards & Modules	
Develop Storyboards Module 1	

Tasks	Notional Duration in Days
Author Storyboards Module 1	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 1	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 1	1
Develop Storyboards Module 2	
Author Storyboards Module 2	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 2	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 2	1
Develop Storyboards Module 3	
Author Storyboards Module 3	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 3	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 3	1
Develop Storyboards Module 4	
Author Storyboards Module 4	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 4	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 4	1
Develop Storyboards Module 5	
Author Storyboards Module 5	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 5	1
Revise Storyboards	5
Conduct Peer Review	1

Tasks	Notional Duration in Days
Conduct SME Review	5
Submit Final Storyboards Module 5	1
Develop Storyboards Module 6	
Author Storyboards Module 6	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 6	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 6	1
Develop Storyboards Module 7	
Author Storyboards Module 7	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 7	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 7	1
Develop Storyboards Module 8	
Author Storyboards Module 8	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 8	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 8	1
Develop Storyboards Module 9	
Author Storyboards Module 9	8
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Storyboards Module 9	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 9	1
Develop Storyboards Module 10	
Author Storyboards Module 10	8
Conduct Peer Review	1
Conduct SME Review	5

Tasks	Notional Duration in Days
Submit Draft Storyboards Module 10	1
Revise Storyboards	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Storyboards Module 10	1
Develop WBT Module 1	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 1	1
Revise Module 1	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 1	1
Develop WBT Module 2	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 2	1
Revise Module 2	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 2	1
Develop WBT Module 3	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 3	1
Revise Module 3	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 3	1
Develop WBT Module 4	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 4	1
Revise Module 4	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 4	1
Develop WBT Module 5	

Tasks	Notional Duration in Days
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 5	1
Revise Module 5	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 5	1
Develop WBT Module 6	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 6	1
Revise Module 6	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 6	1
Develop WBT Module 7	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 7	1
Revise Module 7	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 7	1
Develop WBT Module 8	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 8	1
Revise Module 8	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 8	1
Develop WBT Module 9	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 9	1
Revise Module 9	5
Conduct Peer Review	1

Tasks	Notional Duration in Days
Conduct SME Review	5
Submit Final Module 9	1
Develop WBT Module 10	
Program Interactions and Graphics	7
Conduct Peer Review	1
Conduct SME Review	5
Submit Draft Module 10	1
Revise Module 10	5
Conduct Peer Review	1
Conduct SME Review	5
Submit Final Module 10	1
Presentation of Courseware	
Prepare Presentation Plan	5
Deliver Presentation Plan & Materials	1
Present Courseware	3
Operational Tryout	
Prepare Tryout Plan	5
Perform Operational Tryout	10
Perform Test Item Analysis	2
Author Operational Tryout Report	2
Update Course Products as Required	5
Conduct First Class	
Send TASA and CDG to FAA	1
Perform First Class Conduct	10
Perform Test Item Analysis	2
Author First Class Conduct Report	2
Update Course Products as Required	5
Final Course Products	
Submit Final Revised Course Products	1

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Appendix F: FAA Analysis Synopsis

The interviews of multiple users of TMA yielded varying results. Some consistent themes, however, across all facilities include:

- Need for standardized training
- Need for a comprehensive understanding of the tool
- Need for nationally established procedures
- Need for national training with some local adaptation.

The lack of standardized training is creating a disconnect across the NAS in using TMA. As such, facilities are using the tool inconsistently and without an understanding of the impacts of the actions taken locally and at adjacent airspace(s). In addition to needing a stronger overview of the tool's capabilities, a fundamental understanding of the advantages and disadvantages of using the tool is required.

Curriculum
The elements unanimously identified as being required elements in the training curriculum include but are not limited to:

- Goals/purpose of TMA
- Identification of the best data for metering
- Reprioritization of the list (when to do it and effects)
- Prioritization of the list (time required and why it's important)
- Effects of rippling/reshuffling the list
- Freeze horizon explanation
- Effective use of gaps/how to eliminate or prevent
- Chasing the rate
- Changing the configuration
- Compensating for wind
- Miles in trail (when to use)
- Developing a matrix or adjustment chart
- Hybrid metering
- Daily procedures (daily start time, set up)
- Configuration
- How to log changes that occurred during shift
- How to set up system for accurate routes and times
- Mapping of impacts across the NAS (from one airspace to the next)
- How often the system should be run/utilized
- Effects of dragging and dropping
- Phraseology
- Buttonology
- Tool which requires TMC skills - only a tool

- Methods to lose/gain time
- Management of information
- Timeline understanding
- Graph interpretation
- TM Flow
- Importance of understanding fleet mix
- Other tools that work well with TMA
- Under what situations/conditions TMA should be stopped/turned off?
- TMA Calculations/Conversions
- Impacts of Weather
- Color legend
- How accurate TMA tool can be and how to identify when it is off
- How to utilize “dummy” aircrafts for time adjustments.

Skills Required

Skills identified as being necessary to run TMA effectively include but are not limited to:

- Ability to change behavior from typical CPC
- Ability to recognize impact of actions
- Effective communicator
- Analytical tendencies
- Technically savvy
- Understanding of weather
- Ability to understand runway configurations.

Need for Best Practices Document

The workgroup needs to collectively develop a “Best Practices” document to be included in the training and delivered to users of the TMA system nationwide. This objective must be included in the training development and content phases.

Reference Materials

Reference materials identified as being desirable include: Configurations desk guide; matrix that adjusts limitations; and a matrix that shows rate for special circumstances.

Additional Information

Consensus was found among all sites visited that a portion of this training would have to occur at the local level. A local adaptation for airspace, policies, and procedures is required for effective TMA use.

While there are many elements of the TMA training that can be delivered universally, there are other areas where locally adapted information will be necessary for maximum effectiveness.